DOCUMENT RESUME

ED 315 615 CE 054 163

AUTHOR Torbert, Brison
TITLE Age Learning Factors Affecting Pilot Education.
PUB DATE 89
NOTE 16p.
PUB TYPE Information Analyses (070)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adjustment (to Environment); Adult Development; *Aging (Individuals); *Aircraft Pilots; Air Transportation; Classroom Environment; Educational Gerontology; *Flight Training; *Hearing Impairments; *Physical Mobility; *Visual Impairments

ABSTRACT

This document, intended for pilot education and flight safety specialists, consists chiefly of a review of the literature on physiological factors that affect pilot education and an examination of environmental factors that should be scrutinized in order to improve the effectiveness of aviation learning facilities. The physiological factors addressed in the literature review are vision, hearing, and body mobility. The section on environmental factors includes an Environmental Factors Checklist and advice on its use. Included in that advice are a table of findings gathered when the checklist was used in the author's workplace, conclusions formulated from the findings, and sample recommendations. A summary, a 13-item bibliography, and information about the author conclude the document. (CML)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED315615

AGE LEARNING FACTORS AFFECTING PILOT EDUCATION

The author describes an historical perspective and the development of a checklist for use by Flight Safety and Pilot Trainers in relationship to age correlated learning factors.

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

by
Dr. Brison Torbert
Maintenance Officer
Phoenix Air Guard

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
B Torbert
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

The primary purpose of education is to facilitate the development of competence required for performance in life situations (1). Learning is a lifelong process, and the physical environment of the learner must not detract from the learning process. The physical environment requires provisions for animal comforts (temperature, ventilation, easy access to refreshments and restrooms, comfortable chairs, adequate light, good acoustics, etc.) to avoid blocks to learning (2). The intention of this article is to highlight for the pilot education and flight safety specialist those physiological factors that affect pilot education. This will be accomplished by conducting a review of the current literature in the field of physiological factors affecting the adult learner. This literature discussion will be followed by the examination of those environmental factors that should be scrutinized in order to improve the effectiveness of aviation learning facilities.

CE057463

BEST COPY AVAILABLE

As we get older, mental abilities almost certainly do not decrease. However, what does deteriorate is the body. Arteries become clogged as fat builds up inside the walls, and once they have passed 50 years of age, up to 50 percent of people suffer diminution of blood supply, e.g., oxygen feeding the brain (3). This aging process has a direct impact upon the flight student's ability to concentrate, visualize aircraft conditions, and physical stamina to withstand an intensive flight training program. This would also include the rigors of an accelerated ground training school. Let's initiate this exploration into learning factors by taking a look at the weakest system in the human body: Vision.

VISION

In today's world it is very commonplace for a forty-year old to be getting married, becoming a mother, or grandparent, reaching for a new career as an airline pilot, or entering a college as a freshman (4). In the learning seminar atmosphere, faculty initially help students think about what they see, and how to be good observers. This might cause a focusing on physical layout and the aesthetic appeal of classroom settings. Even the cockpit designers do not always take vision limitations into design considerations. In high speed jets, the simple act of looking around under high G maneuvers can cause straining of neck muscles and render the pilot totally incapable of flight or

safely operating the craft. All flight educators need to carefully review the limitations placed on this body system.

At age 12, the near point of vision (the distance from the eye at which an object can be seen clearly) begins to move away from the eye. Some six years later, visual acuity attains its maximum. By age 20, some 28 percent of all learners suffer from some form of reduced (poor) vision. Once the adult reaches age 35, he or she has a 40 to 60 percent chance of needing to wear corrective lenses. Research reflects that nearly all adults (98 percent) need some form of corrective device by age 42. So if the students in your class have an average age of 24, you now can look upon them as, on the average, 25 percent needing glasses and should have their vision limitations taken into consideration when making class seating assignments and the construction of facilities. If then your average age of students was 38 years old, now you could look upon at least half of your students needing vision accommodations, and the higher aged students may even need special simulator lighting or classroom lighting to provide a conducive learning environment.

Another key factor, in this area of vision awareness, is that aging, at least physiologic aging, is not totally determined by the time elapsed since birth, but by the total amount of wear or tear to which the body has been exposed (5). Thus, it must be understood that true age is a process which is regulated by a certain speed of self-consumption (6). At chronicle age 30, more light is needed to see shades of blue. Color discrimination

begins to decrease from this period up until age 60. Five years later, the relationship between yellow-blue starts to decrease due to the aging of the eyes. Also at age 35, national statistics indicate that approximately 38 percent of all adults should be wearing some form of corrective eye glasses.

Between age 45 and 55, the most striking change in near vision occurs. This can be extremely important if your student body is within this span. It has been observed that these changes can occur in a very subtle manner. The non-focus gray periods normally are recognized in two-hour blocks where the eyes tend to not focus properly for a given distance. A slight head movement will bring the point or object back into focus. These periods expand each day until this out of focus adjustment appears to require other coping behaviors to adjust. These manifestations can be observed by a reduction in wanting to read, head movements, headaches, red eyes, and lower test scores when given complex testing measurements. The aviation facilitator needs to be highly sensitive to their coping skills and be watchful for any adjustments that may require professional eye care for correction.

The loss of vision after age 60 stabilizes and remains constant as long as disease does not take hold and interfere with the aging process. The aviation world does not normally train crew members this age except for professional staff members. Finally, just a reminder, attention to vision problems should be a primary area of focus for all supervisors.

HEARING

Jet noise, industrial machinery, automobiles, monotone guest lecturers all lead to an accelerated loss of hearing. The chronicle hearing loss pattern is as follows: Peak physical performance in this area is obtained by most individuals around the age of 15. But, this strong potential for longevity rapidly starts a steady decline at about age 25. Here, a strong hearing discrimination begins to develop. This is the age span that many aviation careers are initiated by formal training programs. Most authorities agree that the ability to hear high-pitched sounds is lost first, usually after age 40. The majority of adults, however, rarely lose the full ability to hear low-pitched tones (7). Hearing impairment increases gradually until the fifties and then the rate increases rapidly (8). Between the ages of 45 and 55 a marked general loss of hearing starts to take place. This trend continues rapidly until 65 with the highest decrease in hearing discrimination starting at about 55. Men will usually experience greater hearing loss than women beyond the fifties, largely as a result of occupational exposure to noise (8). This natural hearing loss is compounded by what one might call "socially impaired hearing loss." This occurs when the hearing loss constitutes a reduction of about thirty decibels and other people become aware of the deficiency (8).

The ages from 25 to 55 are high demand years for hearing within the aviation community. Here, the flight services' employee is looked upon to be both a journeyman worker and a key

role supervisor. Once over 50, the aviation companies place these employees in the jobs with the highest level of responsibility. This is the stage for the development of corporate knowledge and information. Many of the policy decisions are made by this group. One decision must not be to view hearing loss as something that happens to other folks, but as something that happens to all folks. The pilots who can pass the FAA annual hearing check by focusing their attention on a single sound may not be able to discriminate when three radios are all going on at once in the cockpit. Hearing is a key factor for all aviation teachers and must be taken into consideration in the classroom and workplace environment. They must seek to reduce noise levels in the work environment and other distractions that will hurt the adult learner's chance for success.

Once age 60 is reached, the hearing loss is compounded by individuals finding it hard to follow rapid speech despite little or no actual hearing loss. This physical limitation becomes important when flight safety trainees must deal, on a daily basis, with older staff or faculty members. Everyone must learn and pay attention to hearing loss so that an effective management team is developed.

A FINAL CONSIDERATION: THE BODY

The final consideration in these areas of sight and hearing is basic mobility as it becomes a problem due to joint and bone

disease. Shrinkage of bones due to low calcium takes place at an ever increasing rate after age 60. This is combined with the fact that three-quarters of all adults over the age of 55 have one or more chronic health conditions; many of these conditions are directly related to the eyes and eye movements in general (9).

However, there is light at the end of this aging tunnel. Extensive studies by means of intelligence tests show that mental ability grows rapidly during the late teens or early 20s, and then gradually declines at the rate of about one percent each year after 40 years of age (10). In later studies, experiments involving actual learning situations reveal, however, that it is not the capacity to learn that declines, but the rate of learning. Thus, older adults have just as much capacity for learning as they have when they were younger. They merely learn a little more slowly (11). The real important issue is that the flight safety trainer or supervisor must make cognitive attempts to accommodate to these aging conditions and be aware of naturally generated learning deficiencies.

ENVIRONMENTAL FACTORS

When investigating environmental factors that affect the workplace, researchers believe that business thrives if it is able to stay in tune with the consumers, refining its product or services in accordance with the fluctuating tastes and changing needs (12). Thus, the real flight training institution must

adjust its lifestyle to compensate for the needs of the student population.

Classrooms vary in size and structure from a traditional type with student chairs and chalkboards to an nonstandard type of classroom with long tables and folding chairs to a small area concentrated with learning carousels. In keeping with these variations, one of the primary purposes for this paper was to provide the reader with a checklist to evaluate their own situation.

This all inclusive environmental factors checklist can be used to examine facilities without actual regard to internal design except for where design does not support a positive learning environment. Each area should be scored on a scale of one to three. On the low end, one is a scored area that is considered unsatisfactory (not acceptable) and on the high side, three being an area that is satisfactory (acceptable).

TABLE 1

ENVIRONMENTAL FACTORS CHECKLIST

Rating: 1 = Not Acceptable
2 = Needs Improvement
3 = Acceptable

	ITEM	RATING	REMARKS
1.	Do air conditioning/heating ducts provide adequate circulation and temperature control (78°)?	1-2-3	
2.	Do all exterior windows control sunlight and can be closed from internal viewing when required?	1-2-3	
3.	Is there industrial machine noise (over 80 db) entering the classroom environment?	1-2-3	
4.	Does jet noise alter classroom listening levels?	1-2-3	
5.	Are certain student work areas in shadows or areas of bad reflective lighting?	1-2-3	
6.	Are lighting levels commensurate with average age of students using facility? Guide: Age 25-30: 100 f.c. 30-40: 150 f.c. 40-60+ 180 f.c.	1-2-3	
7.	Are classroom environmental systems free from any chemical pollutants (fumes, jet fuel exhaust, paint vapors etc.)?	1-2-3	
8.	Is classroom environment free from bleed-over noises, e.g., other classroom audios, computer or simulator noises?	1-2-3	
9.	Does the classroom furniture fit your student's size and age range?	1-2-3	

TABLE 1 (Cont'd)

10.	Does each student have enough room to have materials out, take notes, in general enough life space while seated in class?	1-2-3
11.	Are facilities neat and clean?	1-2-3
12.	Do wall furnishings add to the subject matter under consideration?	1-2-3
13.	Are outside traffic and interruptions controlled to the utmost?	1-2-3
14.	Are classroom schedules controlled so that students are conflicting with each other while arriving and exiting?	1-2-3
15.	Does the faculty readily report classroom environment any classroom environment problems? Are there set procedures to cover problem situations?	1-2-3

FINDINGS

Once this survey is completed in each classroom, the results can be tabulated into any form of graph or chart for corporate study and reporting. A study conducted in the author's workplace provided the results as shown in Table 2. It was definite that repair orders could be submitted to repair noise distractions in the classrooms. Lighting levels (foot candles) can be increased with brighter bulbs and alterations can be made to wall paint schemes. Spot industrial high intensity lighting would be purchased to improve the general classroom areas that are dark or have shadows.

TABLE 2

ENVIRONMENTAL FACTORS: CLASSROOM EXAMINATIONS

Room #	Temp (a.m.) Inside/Outside	Temp (p.m.) Inside/Outside	Lighting Lowest/Highest	Noise Distractions (general remarks)
117	77°/71°	88°/94°	36fc/62fc	Loud Clock
121	81°/71°	80°/94°	28fc/44fc	Machine Noise
004	84°/79°	86°/94°	22fc/43fc	Jet Noise
103	83°/79°	90°/94°	40fc/96fc	Machine Noise

Lighting levels, when measured with a light meter, took on a whole new approach with employees and students. Once this investigation started and other employees watched the taking of readings, they also wanted their areas tested. They borrowed the light meter after the rooms were tested and tested their areas. This was a positive spin-off of the study and research that took place.

Finally, the temperature changes that took place in the classroom environments again brought about a different look at a long standing condition. Students would complain about certain classrooms being hot. These complaints were never looked into prior to this study. When one examines Table 2 and sees that classroom 117 has an inside temperature of 88°, while the outside temperature is 94°, a conclusion can be generated. It would be inferred that during normal Arizona summer conditions, the classroom interior temperature exceeds 100°. This would not

normally be considered acceptable for student learning and education.

Once this table is finished, a list of conclusions or recommendations can be formulated. Conclusions that were drawn from this study included: (1) ever changing jet noise levels have an effect on student learning in certain classrooms, (2) classrooms contain equipment that is producing distractions, and (3) at least three of the classrooms need additional insulation to reduce classroom temperatures to acceptable levels.

From this set of conclusions a list of recommendations can be finalized. These recommendations can include management analysis of findings, eye checks for all employees every six years, initiation of repair orders, added insulation to classroom facilities, additional lighting, and a follow-up plan for annual evaluations of facilities. In the end, provisional plans can be produced to insure that the replacement or renovation of facilities include upgrading to federal standards or age related standards, whichever is higher. Other examination areas can be added to the checklist to include suitability of spares, physical plant flow plans, administrative support for students and faculty, or maybe security safeguards not already incorporated in present facilities.

SUMMARY

The intent of this article was to highlight several of the changes that your body will go through as it gets older. As time passes, time begins to move faster. To a four year old, a year is one-quarter of their lives. The same year to a seventy year old is just one-seventieth. This aging process is then combined with physical environment. The physical environment can make it difficult or easy for a student to experience academic growth. One of the biggest challenges has become to turn back the hands of the body clock completely by adjusting the learning environment in lieu of the inability to slow a present aging: ultimately to cheat death (13).

Awareness of one's surroundings is sometimes a very hard concept to generate. All flight education needs to, every once in a while, back off and take a look at its teaching world. The checklist provided here will give you a starting point. From this initial takeoff, long range plans can include making everyone aware of their individual working and learning environments. Flight safety education is on the forefront of technology and now can make the best use of what nature has provided to each one of us.

REFERENCES

1. Knowles, M. The Adult Learner: A Neglected Species. Texas: Gulf Publishing Co., 1984.

2. Knowles, M. Modern Practices of Adult Education. Illinois: Associated Press, 1980.

3. Rose, C. Accelerated Learning. New York: Dell Publishing Co., Inc., October 1987.

4. Miller, J. and M. Musgrove. "Quality Issues in Adult Career Counseling." New Directions for Continuing Education: Issues in Adult Career Counseling. Number 32, Winter 1986, pp. 7.

5. Selye, H. The Stress of Life. New York: McGraw-Hill Book Co., 1984

6. Selye, H. The Stress of Life. New York: McGraw-Hill Book Co., 1984.

7. Bischof, L. Adult Psychology. New York: Harper and Rowe, 1969.

8. Knox, A. Adult Development and Learning. California: Jossey-Bass, 1977.

9. Knox, A. Adult Development and Learning. California: Jossey-Bass, 1977.

10. Knowles, M. Informal Adult Education. New York: Associated Press, 1950.

11. Knowles, M. Informal Adult Education. New York: Associated Press, 1950.

12. Kurpius, D. Learning: Making Learning Environments More Effective. Indiana: Accelerated Development, Inc., 1978.

13. Rose, K. The Body in Time. New York: John Wiley and Sons, Inc., 1988.

Dr. Brison Torbert is the Assistant Aircraft Maintenance Officer for the Phoenix Air Guard. He is also his squadron's Flight Evaluation and Safety Officer. Dr. Torbert is a Master Navigator with over 2,500 hours of KC-135 jet time. He is on the teaching staff of both Paradise Valley Community College and Nova University. His special interests include aging and the physiological aspects of adult learning.